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MEETING NOTES

TO: Distribution **DATE:** July 19, 1994

FROM: Philip Nixon **PROJECT:** Solar Pond IM/IRA

MEMO #: SP307:072194.02

ATTENDANCE:

Phil Nixon
Andy Ledford, EG&G
Mark Austin, EG&G
Harlen Ainscough, CDH
Arturo Duran, EPA
John Haasbeek, ERM
Shaleigh Whitesell, PRC
Steve Keith, EG&G
Frazer Lockhart, DOE
Steve Howard, DOE/SMS
Scott Surovchak, DOE
Errol Lawrence, G&M
Eric Graham, ERM

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SUBJECT: Weekly Status Meeting

(I:\PROJECTS\722446\CORRESP\07219402.WPF\07/21/94)

1) Nitrate Analysis Results and Comparison to Background

Dr. Schmiermund summarized his Friday (7/15/94) presentation by stating that the Nitrate/chloride ratios in the vadose zone pore waters are similar to the Nitrate/chloride ratios in 1960 Solar Evaporation Pond (SEP) water data. He used a simple mixing model to demonstrate the feasibility of obtaining observed Nitrate/chloride ratios in ground water by mixing with vadose zone pore waters when ground water rises. Variable Uranium/Chloride and Gross alpha/chloride ratios indicate that Uranium and Gross alpha are also mobilized. Dr. Schmiermund presented upgradient Nitrate ground water data that, in general, is 2 orders of magnitude less than the wells down gradient from the SEPs. The upgradient wells have nitrate concentrations that are less than the State Standard of 10 mg/L. The down gradient wells have concentrations that greatly exceed 10 mg/L. John Haasbeek indicated that the upgradient wells are positioned such that they are not impacted by contaminant flow from the SEPs. This fact, in combination with the low concentrations of upgradient nitrate indicate that the down gradient wells are not impacted by lateral flow of nitrate contamination from upgradient sources. The conclusion from this analysis is that the SEPs are a source of contaminants to the ground water.

EPA raised the question of whether the subsurface soils should be excavated under the Phase I program since Nitrate was not a RCRA constituent and was in the vadose zone liquids rather than being adhered to soil particles. Frazer Lockhart indicated that the design can be altered to leave the subsurface in place if the Design Criteria are changed such that either the vadose zone under the SEPs will be deferred until the Phase II program, or the CDH relaxes the requirement to address Nitrate flushing problem. Frazer stated that the design criteria have to be changed so that the DOE could provide technical justification for any design change that was agreed upon by the working group. Harlen Ainscough indicated that the CDH regulates Nitrate under the Clean Water Act provisions. A key issue with respect to the contaminant flushing potential centers upon whether the team considers that a ground water rise is a credible potential occurrence. The team has previously agreed based on a review of historical data (10 years) that the groundwater elevation fluctuates and that a rise in the ground water elevation was possible. Therefore, the decision to excavate the subsurface soils with the installation of the subsurface drainage layer was based upon the following:

1. Potential for a rising water table that could not be definitively quantified
2. Long term goals for protection of human health and the environment
3. The stringent ground water comparison criteria for nitrate (10 mg/L)

It was suggested that the soils be flushed *in situ* or removed, washed, and returned to the excavation. Phil Nixon stated that both these alternatives had been evaluated. Soil washing was not favored because it was predicted to be more expensive than the installation of the subsurface drainage layer. *In situ* soil flushing was not selected because the soils are very heterogeneous

with some areas being very impermeable. Therefore, *in situ* soil flushing may not be very effective and process quality control would be nearly impossible.

Arturo indicated that one primary reason why the EPA was concerned about excavating the subsurface soils was because the act of excavation would pose the highest risk to remedial workers. Frazer Lockhart acknowledged this concern. Harlen Ainscough indicated that the CDH favored the excavation and the subsurface drainage layer because the strategy would greatly reduce the SEPs as a source of future groundwater contamination and would be consistent with the Phase II program in that those soils under the IHSS 101 would not have to be specifically addressed by the Phase II remediation.

It was agreed that the CDH and EPA would discuss this issue with their colleagues to get a joint consensus with respect to the regulatory agency position. Scott Surovchak requested that the CDH/EPA focus their discussions on the regulatory criteria that are applicable. The DOE is responsible to arrive at a design that meets the criteria that is cost effective and meets programmatic strategies as specified by the DOE.

2) COC Modeling Under Saturated Conditions

The EPA had inquired why different K_d values were used for the unsaturated and saturated modeling. Leigh Benson reported that the unsaturated model was not defined by a K_d value, but used a solubility approach. This approach was adopted because there was no-site specific geochemical data available and the K_d values from the literature were very broad. In addition, the analysis performed by Dr. Schmiermund indicated that uranium and gross alpha were mobile which would not have been predicted by the literature K_d values. ES suspects that the metals bind to solid materials but the solid materials (sorbents) are mobile under saturated conditions. This is called colloidal-facilitated transport, which has been documented at other sites within the RFP. Therefore the saturated modeling used low K_d values to allow for the colloidal transport of metals and radionuclides. Leigh stated that the colloidal transport mechanism is very difficult to model with simple models.

It was discussed that the ground water comparison criteria that were established as federally promulgated standards or calculated risk based levels (on-site exposure scenario at 1.0x10-6) would be applied as the design criteria at the toe of the engineered cover. The CDH is allowing this since the ground water already exceeds the State ground water protection standards at the toe of the cover. The State standards will be applied at the Phase II Point of Compliance (POC) which is established at essentially the location of the Interceptor Trench System. However, the CDH favors the proposed design of the engineered cover in conjunction with the subsurface drainage system because it predicts that any leachate resulting from the system would meet the State ground water protection standards. Therefore, the closure would be in compliance with

the long term goals of the State of Colorado, and the SEPs should not be a source of any potential future contamination.

ES was asked to modify the table in the IM/IRA-EA Decision Document to replace "Ground Water Comparison Criteria" with "Performance Goals" with a note specifying that designated contaminant goals were based on a risk of 1.0x10-6 or federally promulgated standards. In addition the table should be modified to include the State standards for ground water protection.

3) Potential for Removal of the Asphalt Layer

Phil Nixon provided a copy of the 40% design cost estimate marked-up to remove the 3 layers that could be removed if it were determined that the low-permeability layer was unnecessary (sand, Asphalt, gravel base course). The direct cost savings with respect to purchasing and installing the layers would be $844,619. Based on the historical site mark-up factors, the cost savings could increase to as much as $2,627,146. However, it was pointed out that these cost savings would be offset by the costs of re-engineering for the new design concept, and sampling and analyzing the uncharacterized wastes (sand/cement bags, debris, uncharacterized liners and soils) to ensure that their concentrations did not exceed concentrations that were not appropriate for the design of a engineered cover that did not have a low-permeability layer. Frazer Lockhart indicated that the low permeability layer offers a margin of tolerance for the design to accept uncharacterized wastes. If the low-permeability layer is removed, than it is more important for the DOE to characterize waste materials to ensure that the concentrations of these materials could not result in the production of leachate that exceeds the design criteria. The direct costs of additional sampling and analysis have been estimated at approximately $900,000 which is very close to the direct cost savings associated with removing the low-permeability layer. In addition, any materials that could not be consolidated beneath the engineered cover without a low-permeability layer (due to high concentrations) would need to be stored or disposed which is very expensive. Frazer Lockhart specified that DOE may chose to install the low-permeability layer so the design is less dependent on the concentrations of consolidated wastes and the DOE will not have to extend the project schedule to characterize materials to satisfy themselves that the design criteria will not be exceeded.

4) Sludge Modeling

It was discussed that the sludge contaminant concentrations for many constituents are very similar to the concentrations detected in soils. In some cases the sludge concentration may be higher than the soil concentrations and in other cases the soil concentrations may be higher than the sludge concentrations. This indicates that treatment of the sludge may not be required if the unsaturated modeling is re-run with the constituents from sludge that may be have higher

concentrations than the soils, and the results demonstrate protectiveness. **ES will evaluate the inclusion of untreated sludge in the engineered cover without a low-permeability layer. The untreated sludge will be mixed with contaminated soils and the SEP liners for consolidation beneath the engineered cover. As a conservative approach, the highest concentration for untreated sludge from the various SEPs will be used. The VLEACH computer code will be used to evaluate the potential for leachate production directly beneath the engineered cover. If the contaminant concentrations exceed the ground water protection performance goals, then the MYGRT computer code will be used to calculate contaminant concentrations at the POC. In addition, this same modeling approach will be used for the engineered cover with a low-permeability layer.** Modeling for treated sludge will not be performed unless the modeling results for untreated sludge exceed the ground water protection performance goals.

5) Footprint of the Engineered Cover

Sandy Stenseng presented the footprint of the engineered cover which has been expanded in the "Z" shape configuration so that the 5(H):1(V) slope length can be reduced and to promote flattening of the engineered cover top slopes as much as possible. It was noted that the engineered cover was configured to consolidate all the contaminated materials including soils, liners, sludge, and debris. It was discussed that the excavation of the ponds and the configuration of the engineered cover will cut material back away from the north hillside. Sandy indicated that the hillside will be improved by flattening out the slope at the toe of the cover so that an access road can be installed. Sandy described a new bench (or terrace) design at the north toe of the engineered cover. This bench will enhance the slope stability of the cover system while also provide an access road. It was shown that the excavation under SEP 207-C will cut into the bedrock material which may be positive with respect to the hillside stability concerns. Harlen Ainscough indicated that the geotechnical results will be needed to determine if any slumps extend beneath the engineered cover. It was agreed that the configuration of the engineered cover was satisfactory and could contain the volumes of the materials which DOE intends to consolidate. It was noted that this was contingent upon satisfactory geotechnical results. It was agreed that the subsurface soil and liner volume is approximately 89% of the total waste for consolidation. Therefore the sludge at 7% (treated) would not make much impact on the overall volume. If the geotechnical results demonstrate that there is a problem that can not be corrected by stabilization techniques, then other options might need to be developed:

1. Reconfigure the engineered cover to remove the covered area over SEP 207-C and expand the cover east of SEP 207-B North (this would require removal of Building 964).

2. Clean Close the OU4 area and construct a new landfill within the boundaries of the RFP.

Harlen Ainscough questioned whether it was appropriate to construct an engineered cover over SEP 207-C when there may be a plume of carbon tetrachloride encroaching under the area from upgradient sources. Scott Surovchak indicated that carbon tetrachloride is a very difficult contaminant to extract from ground water. **EG&G/ES will investigate where the carbon tetrachloride plume is currently and predict whether it may migrate under the engineered cover.**

Philip A. Nixon

Agenda

1) Statistical Evaluation of Site Data
2) Developement of PRGs
3) Determining COCs
4) Mapping COCs to Determine extent of Contamination
5) Modeling Approach
   - Infiltration modeling liners and Soils
     - HELP
     - V LEACH
     - MYGRT
   - Modeling under Saturated Conditions
     - VLEACH
     - MYGRT
6) Nitrate Analysis

SUMMARY OF COC INFORMATION

CONTAMINANTS OF CONCERN (COCs)	COC Surface Soils	COC Vadose Soils	Surficial Soil Target Level	Vadose Soil Target Level	RFI/RI Surficial Soil 95% UCL/UTL	RFI/RI Vadose Soil 95% UCL/UTL	Max. Liner Conc. (All Ponds)	CONSERVATIVE SLUDGE CONCENTRATIONS A POND b/	B POND c/	C POND d/	A/B POND e/	Avg. Clarifier Sludge Conc. f/	Debris	Sand Bags
Radionuclides														
Americium-241(pCi/g)	YES	YES	0.27 (PRG)	1.09(PRG)	26.24	3.32	4.03(BN)	87.7	1.05	1.09	1.62	-	-	-
Cesium-134 (pCi/g)	YES	NO	0.001(PRG)	Not a COC	0.04	0.0098	ND j/	-	-	-	-	-	-	-
Plutonium-239,240 (pCi/g)	YES	YES	0.38(PRG)	1.16(PRG)	14.22	6.74	3.12(BN)	213	4.62	0.122	6.00	-	-	-
Radium-226 (pCi/g)	NO	YES	Not a COC g/	0.65(BCKGRND)	NA	1.44	NA	-	-	-	-	-	-	-
Uranium-233 (pCi/g)	YES	NO	5.25(PRG)	Not a COC	14.29	3.23	NA	-	-	-	-	-	-	-
Uranium-234 (pCi/g)	YES	NO	5.32(PRG)	Not a COC	14.29	3.23	4.66(A)	3100	46.9	5.13	67.2	-	-	-
Uranium-235 (pCi/g)	YES	YES	0.09(BCKGRND)	0.80(PRG)	0.163	0.14	0.11(BC)	94.6	1.39	0.53	2	-	-	-
Uranium-238 (pCi/g)	YES	YES	1.27(BCKGRND)	3.86(BCKGRND)	9.66	6.66	2.68(A)	3430	49.1	0.201	71.5	-	-	-
Metals/Inorganics														
Beryllium (mg/kg)	YES	NO	0.92(BCKGRND)	Not a COC	3.98	NA	0.70(BN)	345	1.82	3.12	4.09	-	-	-
Cadmium (mg/kg)	YES	YES	0.64(BCKGRND)	18.80(PRG)	172.1	163.06	69.7(BN)	4730	31.1	48.1	62.2	3770	-	-
Uranium (mg/kg) a/	YES	NO	3.8(BCKGRND)	Not a COC	29	20.0	- k/	-	-	-	-	-	-	-
Organics														
Benzo(a)anthracene (ug/kg)	YES	NO	7.4(PRG)	NA h/	830.29	NA	NA	-	-	-	-	-	-	-
Benzo(a)pyrene (ug/kg)	YES	NO	0.74(PRG)	NA	881.44	NA	NA	-	-	-	-	-	-	-
Benzo(b)fluoranthene (ug/kg)	YES	NO	7.40(PRG)	NA	371.31	NA	NA	-	-	-	-	-	-	-
Benzo(k)fluoranthene (ug/kg)	YES	NO	74.02(PRG)	NA	422.5	NA	NA	-	-	-	-	-	-	-
Bis(2-ethylhexyl)phthalate (ug/kg)	YES	NO	2686.7(PRG)	NA	8129.91	NA	NA	-	-	-	-	-	-	-
Chrysene (ug/kg)	YES	NO	137.39(PRG)	NA	946.1	NA	NA	-	-	-	-	-	-	-
Indeno (1,2,3-cd)pyrene (ug/kg)	YES	NO	7.40(PRG)	NA	712.54	NA	NA	-	-	-	-	-	-	-
Aroclor-1254 (ug/kg)	YES	NO	11.87(PRG)	NA	3251.4	NA	NA	-	-	-	-	-	-	-
COCs Without Target Levels														
Benzo(ghi)perylene ug/kg	YES	NO	---- i/	----	657.34	NA	NA	-	-	-	-	-	-	-
Lithium (mg/kg)	NO	YES	----	----	NA	14.26	13.4(A)	-	-	46.6	-	-	-	-
Sodium (mg/kg)	YES	YES	----	----	1274.36	1863.7	1050(BC)	20600	14100	129000	14100	84600	-	-
Phenanthrene (ug/kg)	YES	NO	----	----	381.55	NA	NA	-	-	-	-	-	-	-

Footnotes:
a/ Values represent U-238 which encompasses essentially all of the natural occurring uranium and has been converted from pCi/g to mg/kg.
b/ Data taken from December 15, 1993 Basis for Interim Operations Report: A/B Pond Sludge Removal and Storage, page 15 of 28
c/ Data taken from December 15, 1993 Basis for Interim Operations Report: A/B Pond Sludge Removal and Storage, page 18 of 28
d/ Data taken from January 19, 1994 Basis for Interim Operations Report: 207C Pond and Clarifier Solution Removal and Storage, page 12 of 23
e/ Data taken from December 15, 1993 Basis for Interim Operations Report: A/B Pond Sludge Removal and Storage, page 19 of 28
f/ Data taken from January 19, 1994 Basis for Interim Operations Report: 207C Pond and Clarifier Solution Removal and Storage, page 9 of 23
g/ "Not a COC" Target Level no exceeded
h/ NA Not Applicable
i/ --- No Target Level due to lack of available toxicity information
j/ ND Not detected during analyses
k/ - analyte not tested for in characterization study

Definitions:
PRG = Preliminary Remediation Goal
BCKGRND = Background Target Level
A = Pond 207A
BN = Pond 207B North
BC = Pond 207B Center

Note: Pond 207C and 207B South liners were not characterized

Attachments
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The following four modeling scenarios will be performed to evaluate impacts to groundwater quality:

1. The first modeling scenario will evaluate the inclusion of untreated sludge in the 1,000 year engineered cover design. The untreated sludge will be mixed with contaminated soil and SEP liners for incorporation into the waste zone beneath the final engineered cover. As a conservative approach, the highest concentration for those COCs analyzed from untreated sludge collected from B Pond, C Pond and A/B Pond will be used. The VLEACH computer code will evaluate the impact to groundwater quality directly beneath the engineered cover. If these contaminant concentrations exceed groundwater cleanup criteria, MYGRT computer code will be used to calculate contaminant concentrations at the Point of Compliance (POC).

2. The second modeling scenario will evaluate the inclusion of untreated sludge in the 30 year RCRA engineered cover design. The untreated sludge will again be mixed with contaminated soil and liners for incorporation into the waste zone. This modeling scenario will take place in the same manner as described in 1., only for a 30 year RCRA cover scenario.

3. The third modeling exercise will include re-evaluating the 30 year RCRA engineered cover without the inclusion of untreated sludge. The conceptual design details and information will be used to assess the contaminant concentrations in groundwater directly beneath the 30 year cover. This scenario has been previously completed for the no-action and 1,000 year design for incorporation in the IM/IRA. Both scenarios revealed that groundwater contaminant concentrations beneath the engineered cover were below cleanup comparison criteria, and protective of groundwater.

4. The forth modeling exercise will include evaluating the groundwater contaminant concentrations at the POC for contaminant concentrations exceeding cleanup comparison criteria directly beneath the engineered cover. Toxicity Characteristic Leaching Procedure (TCLP) data exists for treated sludge collected from the SEPs. This data is presented in ranges. However, portions of these ranges exceed groundwater cleanup comparison criteria. To evaluate the contaminant concentrations at the POC, the MYGRT computer code will measure the fate and transport of the contaminants. The results of the modeling will indicate if the groundwater quality will be impacted due to the treated sludge.

Attachment 7
Page 1 of 1

SUMMARY OF COC INFORMATION

CONTAMINANTS OF CONCERN (COCs)	Ground Water Comparison Criteria	B Pond Conservative Sludge Conc. c/	C Pond Conservative Sludge Conc. d/	A/B Pond Conservative Sludge Conc. e/	Average Clarifier Sludge Conc. f/	TCLP Results
Radionuclides						
Americium-241(pCi/L)	2.11	1050	1090	1620	-	-
Cesium-134 (pCi/L)	-	-	-	-	-	-
Gross Alpha [a/] (pCi/L)	93.86 (GWPS)	83400	5150000	117000	106	<200
Gross Beta [a/] (pCi/L)	37.25 (GWPS)	224000	741000	232000	143000	<200 [g/]
Plutonium-239,240 (pCi/L)	-	4620	122	6000	-	-
Radium-226 (pCi/L)	-	-	-	-	-	-
Uranium-233 (pCi/L)	-	-	-	-	-	-
Uranium-234 (pCi/L)	-	46900	5130	67200	-	-
Uranium-235 (pCi/L)	1.88	1390	530	2000	-	-
Uranium-238 (pCi/L)	-	49100	201	71500	-	-
Metals/Inorganics						
Beryllium (mg/kg)	-	1.82	3.12	4.09	-	-
Cadmium (mg/kg)	0.01	31.1	48.1	62.2	3770	<.005
Uranium [b/] (mg/kg)	-	-	-	-	-	-
Organics						
Benzo(a)anthracene (mg/kg)	-	-	-	-	-	-
Benzo(a)pyrene (mg/kg)	-	-	-	-	-	-
Benzo(b)fluoranthene (mg/kg)	-	-	-	-	-	-
Benzo(k)fluoranthene (mg/kg)	-	-	-	-	-	-
Bis(2-ethylhexyl)phthalate (mg/kg)	-	-	-	-	-	-
Chrysene (mg/kg)	-	-	-	-	-	-
Indeno (1,2,3-cd)pyrene (mg/kg)	-	-	-	-	-	-
Other						
Aroclor-1254 (mg/kg)	0.001	-	-	-	-	-
COCs Without Target Levels						
Benzo(ghi)perylene (mg/kg)	-	-	-	-	-	-
Lithium (mg/kg)	-	-	46.6	-	-	-
Sodium (mg/kg)	-	14100	129000	14100	84600	-
Phenanthrene (mg/kg)	-	-	-	-	-	-

Footnotes:

[a/] Only radioactive analyses performed during Halliburton Solidification Feasibility Study; not a COC

[b/] Values represent U-238 which encompasses essentially all of the natural occurring uranium and has been converted from pCi/g to mg/kg.

[c/] Data taken from December 15, 1993 Basis for Interim Operations Report: A/B Pond Sludge Removal and Storage, page 18 of 28

[d/] Data taken from January 19, 1994 Basis for Interim Operations Report: 207C Pond and Clarifier Solution Removal and Storage, page 12 of 23

[e/] Data taken from December 15, 1993 Basis for Interim Operations Report: A/B Pond Sludge Removal and Storage, page 19 of 28

[f/] Data taken from January 19, 1994 Basis for Interim Operations Report: 207C Pond and Clarifier Solution Removal and Storage, page 9 of 23

[g/] Gross Beta Measurements for A/B Solidified sludge were < 200 pCi/L; Gross Beta Measurements for Clarifier/C Solidified Sludge ranged from 280 +/- 100 to 780 +/- 110 pCi/L

Definitions:

GWPS = Ground Water Protection Standard

SUMMARY OF COC INFORMATION

CONTAMINANTS OF CONCERN (COCs)	COC Surficial Soils	COC Vadose Soils	Ground Water Comparison Criteria	Surficial Soil Target Level	Vadose Soil Target Level	RFI/RI Surficial Soil 95% UCL/UTL	RFI/RI Vadose Soil 95% UCL/UTL	Max. Liner Conc. (All Ponds)	Conservative Estimate of Sludge Concentration (mg/kg) B POND c/	C POND d/	A/B POND e/	Average Clarifier Sludge Conc. f/	Debris	Sand Bags	Stabilized Sludge TCLP Results (ug/L)
Radionuclides															
Americium-241(pCi/g)	YES	YES	2.11 pCi/L	0.27 (PRG)	1.09(PRG)	26.24	3.32	4.03(BN)	1.05	1.09	1.62	-	-	-	-
Cesium-134 (pCi/g)	YES	NO		0.001(PRG)	Not a COC	0.04	0.0098	ND [j]	-	-	-	-	-	-	-
Gross Alpha (pCi/g) [a]	NO	NO	93.86 pCi/L (GWPS)	Not a COC [g]	Not a COC [g]	-	-	-	83.4	5150	117	0.106			<200 pCi/L
Gross Beta (pCi/g) [a]	NO	NO	37.25 pCi/L (GWPS)	Not a COC [g]	Not a COC [g]	-	-	-	224	741	232	143			<200 pCi/L
Plutonium-239,240 (pCi/g)	YES	YES		0.38(PRG)	1.16(PRG)	14.22	6.74	3.12(BN)	4.62	0.122	6.00	-	-	-	-
Radium-226 (pCi/g)	NO	YES		Not a COC [g]	0.65(BCKGRND)	NA	1.44	NA	-	-	-	-	-	-	-
Uranium-233 (pCi/g)	YES	NO		5.25(PRG)	Not a COC	14.29	3.23	NA	-	-	-	-	-	-	-
Uranium-234 (pCi/g)	YES	NO		5.32(PRG)	Not a COC	14.29	3.23	4.66(A)	46.9	5.13	67.2	-	-	-	-
Uranium-235 (pCi/g)	YES	YES	1.88 pCi/L	0.09(BCKGRND)	0.80(PRG)	0.163	0.14	0.11(BC)	1.39	0.53	2	-	-	-	-
Uranium-238 (pCi/g)	YES	YES		1.27(BCKGRND)	3.86(BCKGRND)	9.66	6.66	2.68(A)	49.1	0.201	71.5	-	-	-	-
Metals/Inorganics															
Beryllium (mg/kg)	YES	NO		0.92(BCKGRND)	Not a COC	3.98	NA	0.70(BN)	1.82	3.12	4.09	-	-	-	-
Cadmium (mg/kg)	YES	YES	10 ppb	0.64(BCKGRND)	18.80(PRG)	172.1	163.06	69.7(BN)	31.1	48.1	62.2	3770	-	-	<5
Uranium (mg/kg) [b]	YES	NO		3.8(BCKGRND)	Not a COC	29	20.0	- [k]	-	-	-	-	-	-	-
Organics									-						
Benzo(a)anthracene (ug/kg)	YES	NO		7.4(PRG)	NA [h]	830.29	NA	NA	-	-	-	-	-	-	-
Benzo(a)pyrene (ug/kg)	YES	NO		0.74(PRG)	NA	881.44	NA	NA	-	-	-	-	-	-	-
Benzo(b)fluoranthene (ug/kg)	YES	NO		7.40(PRG)	NA	371.31	NA	NA	-	-	-	-	-	-	-
Benzo(k)fluoranthene (ug/kg)	YES	NO		74.02(PRG)	NA	422.5	NA	NA	-	-	-	-	-	-	-
Bis(2-ethylhexyl)phthalate (ug/	YES	NO		2686.37	NA	8129.91	NA	NA	-	-	-	-	-	-	-
Chrysene (ug/kg)	YES	NO		137.39(PRG)	NA	946.1	NA	NA	-	-	-	-	-	-	-
Indeno (1,2,3-cd)pyrene (ug/kg	YES	NO		7.40(PRG)	NA	712.54	NA	NA	-	-	-	-	-	-	-
Other															
Aroclor-1254 (ug/kg)	YES	NO	1 ppb	11.87(PRG)	NA	3251.4	NA	NA	-	-	-	-	-	-	-
COCs Without Target Levels															
Benzo(ghi)perylene ug/kg	YES	NO		---- [i]	----	657.34	NA	NA	-	-	-	-	-	-	-
Lithium (mg/kg)	NO	YES		----	----	NA	14.26	13.4(A)	-	46.6	-	-	-	-	-
Sodium (mg/kg)	YES	YES		----	----	1274.36	1863.7	1050(BC)	14100	129000	14100	84600	-	-	-
Phenanthrene (ug/kg)	YES	NO		----	----	381.55	NA	NA	-	-	-	-	-	-	-

Footnotes:

[a] Only radioactive analyses performed during Halliburton Solidification Feasibility Study; not a COC

[b] Values represent U-238 which encompasses essentially all of the natural occurring uranium and has been converted from pCi/g to mg/kg.

[c] Data taken from December 15, 1993 Basis for Interim Operations Report: A/B Pond Sludge Removal and Storage, page 18 of 28

[d] Data taken from January 19, 1994 Basis for Interim Operations Report: 207C Pond and Clarifier Solution Removal and Storage, page 12 of 23

[e] Data taken from December 15, 1993 Basis for Interim Operations Report: A/B Pond Sludge Removal and Storage, page 19 of 28

[f] Data taken from January 19, 1994 Basis for Interim Operations Report: 207C Pond and Clarifier Solution Removal and Storage, page 9 of 23

[g] "Not a COC" Target Level no exceeded

[h] NA Not Applicable

[i] --- No Target Level due to lack of available toxicity information

[j] ND Not detected during analyses

[k] - analyte not tested for in characterization study

Definitions:

PRG = Preliminary Remediation Goal

BCKGRND = Background Target Level

GWPS = Ground Water Protection Standard

A = Pond 207A

BN = Pond 207B North

BC = Pond 207B Center

Note: Pond 207C and 207B South liners were not characterized

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ES ENGINEERING-SCIENCE, INC.

Attachment 8

Client _____ Job No. _____ Sheet 1 of 1

Subject _____ By _____ Date 7-11-94

_____ Checked _____ Rev. _____

TOTAL VOLUME OF WASTE TO COVER:

EXCAVATED LINERS & SOILS FROM UNDER ALL SEPS DOWN TO HIST. MEAN SEASONAL HIGH WATERTABLE AND 6IN. SURFICIAL FROM N. IHIISS BOUNDARY TO SEEPLINE	155,904 cy
STABILIZED SLUDGE	13,000 cy
SURFACIAL SOILS (TOP 6 IN.) NORTH OF PERIMETER FENCE	5,400 cy
BUILDING 788 MAT'L AND CONCRETE ENTOMBMENT	500 cy
DRUMS	30 cy
	174,834 cy

Attachment 5
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APPENDIX IV.E

COST ESTIMATE DETAILS

TAKEOFF QTY	<----------LABOR----------> UNIT PRICE	AMOUNT	<----------MATRL----------> UNIT PRICE	AMOUNT	<-------SUB-----> AMOUNT	NAME	<----------EQUIP----------> UNIT PRICE	AMOUNT	TOTAL AMOUNT
910.000 SPEC. CONDITIONS									
0100.000 BASELINE RAD/HAZ SURVEY									
0002 SET-UP STAGING AREA									
80.00 MH	65.00 /MH	5,200			-				5,200
0003 SET-UP EXCLUSION ZONE									
160.00 MH	65.00 /MH	10,400			-				10,400
0004 SET-UP STEP-OFF/SURVEY AREA									
80.00 MH	65.00 /MH	5,200			-				5,200
0005 DEVELOP RAD. WORKER PERMIT									
80.00 MH	65.00 /MH	5,200			-				5,200
0006 BASELINE SURVEY BY HPT									
80.00 MH	65.00 /MH	5,200			-				5,200
0007 OBTAIN EXCAVATION PERMIT									
40.00 MH	65.00 /MH	2,600			-				2,600
0008 CONDUCT TRAINING ON SAMPLING									
60.00 MH	65.00 /MH	3,900			-				3,900
0009 PHASE II ACTIVITIES									
1.00 LS					-				0
0010 MODIFY RAD WORKER PERMIT									
40.00 MH	65.00 /MH	2,600			-				2,600
0011 WRITE H & S PLAN									
640.00 MH	65.00 /MH	41,600			-				41,600
0012 PHASE III ACTIVITIES									
1.00 LS					-				0
0012 ZONE B WELL ABANDONMENT									
1.00 LS			66,000.00 /LS	**66,000**	-				66,000
0013 DAILY SURVEYS									
4,000.00 MH	65.00 /MH	260,000			-				260,000
0014 COVER SURF CONTAMINATION									
2,800.00 MH	65.00 /MH	182,000			-				182,000
BASELINE RAD/HAZ SUR		523,900*		66,000*					589,900*
			Labor hrs:	8,060.00		Equip hrs:		8,060.00	
0200.000 MONITOR JOB SITE REM									
0002 ENTER EXIT JOBSITE									
20,180.00 MH	40.00 /MH	807,200			-				807,200
0015 RAD TECHNICIANS 4-9 MONTHS									
4,536.00 MH	34.53 /MH	156,628			-				156,628
MONITOR JOB SITE REM		963,828*							963,828*
			Labor hrs:	24,716.00		Equip hrs:		24,716.00	
5000.000 INDIRECT FIELD COSTS									
0011 OBTAIN BUILDING PERMITS									
80.00 MH	40.00 /MH	3,200			-				3,200
0012 COST OF PERMIT									
1.00 LS			500.00 /LS	500	-				500
0013 MOBILIZATION									
1,000.00 MH	40.00 /MH	40,000			-				40,000
0014 SANITARY (PORTABLE TOILETS) 8									
26.00 MO					-		584.00 /MO	15,184	15,184
0015 HANDWASH UNIT - 4									
26.00 MO					-		340.00 /MO	8,840	8,840
0016 EYEWASH UNIT - 4									
26.00 MO					-		116.62 /MO	3,032	3,032
0017 TEMPORARY UTILS (PHONE,WATER)									

Attachment 9
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TAKEOFF QTY	LABOR UNIT PRICE	LABOR AMOUNT	MATRL UNIT PRICE	MATRL AMOUNT	SUB AMOUNT	SUB NAME	EQUIP UNIT PRICE	EQUIP AMOUNT	TOTAL AMOUNT
26.00 MO			500.00 /MO	13,000		-			13,000
0019 SECURITY FENCE									
2,090.00 LF	6.00 /LF	12,540	4.00 /LF	8,360		-			20,900
0020 TERMINAL POSTS									
8.00 EA	105.00 /EA	840	70.00 /EA	560		-			1,400
0021 SECURITY GATES									
4.00 EA	606.00 /EA	2,424	404.00 /EA	1,616		-			4,040
0022 LIGHTS NORTH OF SEEPLINE									
26.00 MO						-	4,100.00 /MO	106,600	106,600
0023 LIGHTS SOUTH OF SEEPLINE									
26.00 MO						-	4,100.00 /MO	106,600	106,600
0024 TRUCKS									
.00 DY						-			0
0025 WATER TANKER (631WW) & OPER									
572.00 DY	320.00 /DY	183,040				-	1,235.00 /DY	706,420	889,460
0026 OFF HIGHWAY TRUCK (77C) & OPER									
572.00 DY	320.00 /DY	183,040				-	1,910.00 /DY	1,092,520	1,275,560
0027 WHEEL LOADER (992C) & OPER									
572.00 DY	320.00 /DY	183,040				-	2,995.00 /DY	1,713,140	1,896,180
0028 MOBILE LAB FOR GEO SOIL TEST									
26.00 MO						-	700.00 /MO	18,200	18,200
0029 GEOTECHNICAL TECH									
1,500.00 MH	80.00 /MH	120,000				-			120,000
0030 FIELD TECH									
3,000.00 MH	80.00 /MH	240,000				-			240,000
0031 MOBILE ANALYTICAL LAB									
.00 DY						-			0
0032 STAFFED LAB									
120.00 DY	3,000.00 /DY	360,000				-			360,000
0033 STAND-BY LAB									
120.00 DY	800.00 /DY	96,000				-			96,000
0034 SITE PREP. TRAILER AREA									
.00 MO						-			0
0035 ROAD BASE (6") AND GRADING									
740.00 SY	.06 /SY	44	7.54 /SY	5,580		-	.04 /SY	30	5,654
0036 OFFICE TRAILER									
26.00 MO						-	375.00 /MO	9,750	9,750
0037 BREAK TRAILER									
26.00 MO						-	260.00 /MO	6,760	6,760
0038 TRAILER WITH LOCKERS									
26.00 MO						-	375.00 /MO	9,750	9,750
0039 PERSONNEL DECON TRAILER W/SHOW									
26.00 MO						-	550.00 /MO	14,300	14,300
0040 LAB/TRAILER:SET-UP/REMOVE									
6.00 LS						-	505.00 /LS	3,030	3,030
0041 PREPARE BACKFILL STOCKPILE									
200,000.00 SY	.10 /SY	20,000				-	.07 /SY	14,000	34,000
0043 H & S EQUIPMENT									
1.00 LS						-	605,700.00 /LS	605,700	605,700
0044 DEMOBILIZATION/SITE CLEAN-UP									
1.00 LS	120,000.00 /LS	120,000				-			120,000
0045 DECON OF EQUIPMENT INSIDE PA									
800.00 MH	17.84 /MH	14,272				-			14,272
0046 DECON OF EQUIPMENT BUFFER ZONE									
400.00 MH	17.84 /MH	7,136				-			7,136
0048 PURCHASE WASTE CRATES									

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TAKEOFF QTY	LABOR UNIT PRICE	LABOR AMOUNT	MATRL UNIT PRICE	MATRL AMOUNT	SUB AMOUNT	SUB NAME	EQUIP UNIT PRICE	EQUIP AMOUNT	TOTAL AMOUNT
100.00 EA			260.00 /EA	26,000	-				26,000
0049 INSTALL LIDS ON WASTE CRATES									
100.00 EA	12.00 /EA	1,200			-				1,200
0050 OFFLOAD WASTE CRATES									
100.00 EA	7.00 /EA	700			-				700
0051 ASSAY WASTE CRATES									
200.00 MH	80.00 /MH	16,000			-				16,000
INDIRECT FIELD COSTS		1,603,476*		55,616*				4,433,856*	6,092,948*
			Labor hrs:	22,628.00		Equip hrs:	22,628.00		
6000.000 RELOCATE POWER LINES									
0039 LOCK-OUT/TAG-OUT									
64.00 MH	81.80 /MH	5,235			-				5,235
0040 INSTALL POWER POLES									
563.00 MH	33.17 /MH	18,675	22.00 /MH	12,386	-				31,061
0045 INSTALL CONDUCTORS									
2,600.00 LF	3.14 /LF	8,164	2.10 /LF	5,460	-				13,624
0046 TIE IN RELOCATED POWER LINES									
121.00 MH	33.17 /MH	4,014			-				4,014
0047 PERFORM HI-POT TEST NEW POLES									
241.00 MH	33.17 /MH	7,994			-				7,994
0048 REMOVE OBS POWER LINES & POLES									
392.00 MH	33.17 /MH	13,003			-				13,003
0049 TRANSPORT & STORE POWER LINES									
181.00 MH	33.17 /MH	6,004			-				6,004
0050 SHRED OBS POLES & DISPOSE OF									
120.00 MH	33.17 /MH	3,980			-				3,980
RELOCATE POWER LINES		67,068*		17,846*					84,914*
			Labor hrs:	1,682.00		Equip hrs:	1,682.00		
7000.000 VEGETATION REMOVAL									
0052 LIE DOWN LINER (DOUBLE)									
24.00 MH	40.00 /MH	960			-				960
0053 BOTTOM LINER									
9,000.00 SF			1.50 /SF	13,500	-				13,500
0054 EXCAVATE VEG & SOILS									
2,251.00 CY	1.26 /CY	2,836			-		.84 /CY	1,891	4,727
0055 COVER VEG & SOILS W/TARP									
24.00 MH	40.00 /MH	960			-				960
0056 TOP LINER									
9,000.00 SF			1.00 /SF	9,000	-				9,000
VEGETATION REMOVAL		4,756*		22,500*				1,891*	29,147*
			Labor hrs:	48.00		Equip hrs:	48.00		
8000.000 POND PREP FOR COVER									
0001 POND PREPARATION									
.00 CY					-				0
0002 GRIND POND LINERS 8000									
11,800.00 CY	.24 /CY	2,832			-		.08 /CY	944	3,776
0003 MOVE & STOCKPILE LINERS									
5,900.00 CY	1.51 /CY	8,909			-		1.01 /CY	5,959	14,868
0004 EXCAVATE BERMS & ZONES A&B									
101,586.00 CY	1.26 /CY	127,998			-		.84 /CY	85,332	213,331
0005 HAND CLEARING @ MONITOR WELLS									
1,000.00 MH	17.62 /MH	17,620			-				17,620
0006 EXCESSIVE MATERIAL HANDLING									

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TAKEOFF QTY	LABOR UNIT PRICE	LABOR AMOUNT	MATRL UNIT PRICE	MATRL AMOUNT	SUB AMOUNT	SUB NAME	EQUIP UNIT PRICE	EQUIP AMOUNT	TOTAL AMOUNT
304,758.00 CY	1.51 /CY	460,185				-	1.01 /CY	307,806	767,990
0007 EXCAVATE ZONE B									
17,500.00 CY	1.26 /CY	22,050				-	.84 /CY	14,700	36,750
0008 DOUBLE HANDLING									
35,000.00 CY	1.51 /CY	52,850				-	1.01 /CY	35,350	88,200
0009 BACKFILL									
17,500.00 CY			6.27 /CY	109,725		-			109,725
0013 MOVE & PLACE BACKFILL									
101,586.00 CY	1.51 /CY	153,395	6.27 /CY	636,944		-	1.01 /CY	102,602	892,941
0014 DISPOSE A & B TO H.M.H.W.T.									
101,586.00 CY	1.51 /CY	153,395				-	1.01 /CY	102,602	255,997
0015 SUBSURFACE DRAIN									
.00 CY						-			0
0016 DELIVERY OF GRAVEL									
34,451.00 CY			15.07 /CY	519,177		-			519,177
0017 MOVE GRAVEL									
34,451.00 CY	1.51 /CY	52,021				-	1.01 /CY	34,796	86,817
0018 GRADE GRAVEL (3 PASSES)									
1,116,225.00 CY	.06 /CY	66,974				-	.04 /CY	44,649	111,623
0019 DELIVERY OF SAND									
13,780.00 CY			8.28 /CY	114,098		-			114,098
0020 MOVE SAND									
13,780.00 CY	1.51 /CY	20,808				-	1.01 /CY	13,918	34,726
0021 GRADE SAND (2 PASSES)									
744,150.00 CY	.06 /CY	44,649				-	.04 /CY	29,766	74,415
0022 EXCAVATE C POND SOILS									
45,751.00 CY	1.26 /CY	57,646				-	.84 /CY	38,431	96,077
0023 MOVE C POND SOILS TOP DRAINAGE									
45,751.00 CY	1.51 /CY	69,084				-	1.01 /CY	46,209	115,293
0024 MOVE BAL OF BERMS TOP DRAINAGE									
1,238.00 CY	1.51 /CY	1,869				-	1.01 /CY	1,250	3,120
0025 SPREAD LINER MATERIAL									
11,800.00 CY	1.51 /CY	17,818				-	1.01 /CY	11,918	29,736
0026 GRADE SOIL, LINER & BERM									
37,024.00 CY	.06 /CY	2,221				-	.04 /CY	1,481	3,702
0027 COMPACT 207A & B PONDS									
128,000.00 SY	.04 /SY	5,120				-	.03 /SY	3,840	8,960
0028 CONSTRUCT EQUIPMENT DECON AREA									
1.00 LS						-	60,000.00 /LS	60,000	60,000
0029 MOVE & DIST. SOILS FROM N HILL									
2,251.00 CY	1.51 /CY	3,399				-	1.01 /CY	2,274	5,673
0030 GRADE SOILS IN SEP 207C									
9,225.00 SY			.06 /SY	554		-	.04 /SY	369	923
0031 COMPACT 207C POND									
18,450.00 SY	.04 /SY	738				-	.03 /SY	554	1,292
0032 RECLAIM POND C AREA									
.00 CY						-			0
0033 DELIVERY OF GENERAL BACKFILL									
4,613.00 CY			6.27 /CY	28,924		-			28,924
0034 MOVE GENERAL BACKFILL									
4,613.00 CY	1.51 /CY	6,966				-	1.01 /CY	4,659	11,625
0035 GRADE GENERAL BACKFILL									
4,613.00 CY	.06 /CY	277				-	.04 /CY	185	461
0036 DELIVERY OF TOPSOIL									
1,538.00 CY			19.03 /CY	29,268		-			29,268
0037 MOVE TOPSOIL									

Attachment 9
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TAKEOFF QTY	LABOR UNIT PRICE	LABOR AMOUNT	MATRL UNIT PRICE	MATRL AMOUNT	SUB AMOUNT	SUB NAME	EQUIP UNIT PRICE	EQUIP AMOUNT	TOTAL AMOUNT
1,538.00 CY	1.51 /CY	2,322				-	1.01 /CY	1,553	3,876
0038 GRADE TOPSOIL									
1,538.00 CY	.06 /CY	92				-	.04 /CY	62	154
0039 DELIVERY OF PEA GRAVEL									
246.00 CY			15.50 /CY	3,813		-			3,813
0040 MOVE PEA GRAVEL									
246.00 CY	1.51 /CY	371				-	1.01 /CY	248	620
0041 GRADE PEA GRAVEL									
246.00 CY	.06 /CY	15				-	.04 /CY	10	25
0042 SEED POND C									
1.90 AC						-	2,500.00 /AC	4,750	4,750
POND PREP FOR COVER		1,351,624*		1,442,502*				956,214*	3,750,341*
1.000 LS		3,750,341.100/LS	Labor hrs:	1,000.00		Equip hrs:	1,000.00		
9000.000 STABILIZE HILLSIDE									
0043 STABILIZE HILLSIDE									
.00 CY						-			0
0044 DELIVER TOPSOIL									
10,389.00 CY			19.03 /CY	197,703		-			197,703
0045 MOVE TOPSOIL									
10,389.00 CY	1.51 /CY	15,687				-	1.01 /CY	10,493	26,180
0046 GRADE TOPSOIL									
10,389.00 CY	.06 /CY	623				-	.04 /CY	416	1,039
0047 HYDROSEED									
13.50 AC						-	2,500.00 /AC	33,750	33,750
0048 DELIVER PEA GRAVEL									
1,662.00 CY			15.50 /CY	25,761		-			25,761
0049 MOVE PEA GRAVEL									
1,662.00 CY	1.51 /CY	2,510				-	1.01 /CY	1,679	4,188
0050 GRADE PEA GRAVEL									
30,000.00 CY	.06 /CY	1,800				-	.04 /CY	1,200	3,000
STABILIZE HILLSIDE		20,620*		223,464*				47,537*	291,621*
10000.000 UTILITIES									
010 DESIGN/REVIEW SHORING ACT									
200.00 LS	90.00 /LS	18,000				-			18,000
011 SHORING (EXCAVATION/REMOVAL									
5,580.00 LS	40.40 /LS	225,432				-			225,432
012 SHORING (excavation/grouting)									
1,150.00 LF	8.08 /LF	9,292				-			9,292
013 REMOVE 3"-LD-STL									
60.00 LF	27.24 /LF	1,634				-	1.33 /LF	80	1,714
014 REMOVE 3"-LD-STL									
60.00 LF	27.24 /LF	1,634				-	1.33 /LF	80	1,714
015 REMOVE 3"PW-STL									
60.00 LF	27.24 /LF	1,634				-	1.33 /LF	80	1,714
016 REMOVE & GROUT 3"PW-SST									
570.00 LF	27.24 /LF	15,527				-	1.33 /LF	758	16,285
018 REMOVE & RELOCATE 6" RW-CI									
550.00 LF	27.24 /LF	14,982				-	1.33 /LF	732	15,714
019 REMOVE 3" SROB-CAP									
310.00 LF	27.24 /LF	8,444				-	1.33 /LF	412	8,857
020 REMOVE 8" PWF-CI									
40.00 LF	27.24 /LF	1,090				-	1.33 /LF	53	1,143
021 REMOVE 8" PW-CI									
30.00 LF	27.24 /LF	817				-	1.33 /LF	40	857

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TAKEOFF QTY	LABOR UNIT PRICE	LABOR AMOUNT	MATRL UNIT PRICE	MATRL AMOUNT	SUB AMOUNT	SUB NAME	EQUIP UNIT PRICE	EQUIP AMOUNT	TOTAL AMOUNT
022 REMOVE 440V-E									
180.00 LF	27.24 /LF	4,903			-		1.33 /LF	239	5,143
023 REMOVE 440-V-E									
620.00 LF	27.24 /LF	16,889			-		1.33 /LF	825	17,713
024 REMOVE 15"-SD-CMP									
520.00 LF	27.24 /LF	14,165			-		1.33 /LF	692	14,856
025 REMOVE/RELOCAT 440V-E									
320.00 LF	27.24 /LF	8,717			-		1.33 /LF	426	9,142
026 REMOVE/RELOCATE TELEPHONE									
350.00 LF	27.24 /LF	9,534			-		1.33 /LF	466	10,000
027 REMOVE @ 10" PW-PVC/6"PW-VCP									
290.00 LF	27.24 /LF	7,900			-		1.33 /LF	386	8,285
028 REMOVE 3"SROB-CAP									
90.00 LF	27.24 /LF	2,452			-		1.33 /LF	120	2,571
029 REMOVE 3/4" E-PVC									
90.00 LF	27.24 /LF	2,452			-		1.33 /LF	120	2,571
031 GROUT 8" RW-CAP									
390.00 LF	46.98 /LF	18,322			-		11.08 /LF	4,321	22,643
032 REMOVE 12" OS-CMP									
50.00 LF	27.24 /LF	1,362			-		1.33 /LF	67	1,429
033 REMOVE 1-1/2" DCW-STL									
320.00 LF	27.24 /LF	8,717			-		1.33 /LF	426	9,142
034 REMOVE 3" SROP/3"ROPW-CAP									
140.00 LF	27.24 /LF	3,814			-		1.33 /LF	186	4,000
035 REMOVE 8" PW-CI									
20.00 LF	27.24 /LF	545			-		1.33 /LF	27	571
0030 GROUT 8"RW-CAP									
760.00 LF	46.98 /LF	35,705			-		11.08 /LF	8,421	44,126
0036 REMOVE 8"PW-CI									
50.00 LF	27.24 /LF	1,362			-		1.33 /LF	67	1,429
0037 DISPOSE OF UTILITIES									
6,730.00 LF	1.51 /LF	10,162			-		1.01 /LF	6,797	16,960
0038 CUT,TRANSPORT & STORE PIPING									
6,730.00 LF	3.00 /LF	20,190			-				20,190
UTILITIES		465,676*						25,817*	491,493*
11000.000 INSTALL FINAL ENG. COVER									
074 DELIVERY OF RIP RAP (2-4")									
10,802.00 CY			15.07 /CY	162,786	-				162,786
075 MOVE RIP RAP									
10,802.00 CY	1.51 /CY	16,311			-		1.01 /CY	10,910	27,221
076 GRADE RIP RAP (2 PASSES)									
84,340.00 CY	.06 /CY	5,060			-		.04 /CY	3,374	8,434
077 COMPACT RIP RAP									
42,170.00 SY	.04 /SY	1,687			-		.03 /SY	1,265	2,952
085 COMPACT BACKFILL (3 PASSES)									
126,510.00 SY	.04 /SY	5,060			-		.03 /SY	3,795	8,856
~~0061 DELIVERY OF GRAVEL BASE~~									
~~5,400.00 CY~~			~~15.07 /CY~~	~~81,378~~					~~81,378~~
~~0062 MOVE GRAVEL TO POND 207A~~									
~~5,400.00 CY~~	~~1.51 /CY~~	~~8,154~~					~~1.01 /CY~~	~~5,454~~	~~13,608~~
~~0063 GRADE GRAVEL IN POND 207A~~									
~~42,170.00 CY~~	~~.06 /CY~~	~~2,530~~					.04 /CY	1,687	~~4,217~~
~~0064 COMPACT LOWER BASE COURSE~~									
~~42,170.00 SY~~	~~.04 /SY~~	~~1,687~~					~~.03 /SY~~	~~1,265~~	~~2,952~~
~~0065 DELIVERY OF ASPHALT CONCRETE~~									

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TAKEOFF QTY	LABOR UNIT PRICE	LABOR AMOUNT	MATRL UNIT PRICE	MATRL AMOUNT	SUB AMOUNT	SUB NAME	EQUIP UNIT PRICE	EQUIP AMOUNT	TOTAL AMOUNT
~~42,170.00 SY~~			~~12.02 /SY~~	~~506,883~~					~~506,883~~
~~0066 UNLOAD & DIST ASPHALT CONCRETE~~									
~~42,170.00 SY~~	~~1.51 /SY~~	~~63,677~~					~~1.01 /SY~~	~~42,592~~	~~106,268~~
~~0067 DELIVERY OF SAND (DRAINAGE)~~									
~~10,802.00 CY~~			~~8.28 /CY~~	~~89,441~~					~~89,441~~
~~0068 MOVE SAND FOR LOWER SAND LAYER~~									
~~10,802.00 CY~~	~~1.51 /CY~~	~~16,311~~					~~1.01 /CY~~	~~10,910~~	~~27,221~~
~~0069 GRADE LOWER SAND LAYER (2LIFT)~~									
~~84,340.00 SY~~	~~.06 /SY~~	~~5,060~~					~~.04 /SY~~	~~3,374~~	~~8,434~~
~~0070 COMPACT LOWER SAND LAYER~~									
~~42,170.00 SY~~	~~.04 /SY~~	~~1,687~~					~~.06 /SY~~	~~2,530~~	4,217
0071 DEL OF ANGULAR RIPRAP (6-10")									
16,214.00 CY			18.28 /CY	296,392	-				296,392
0072 MOVE ANGULAR RIPRAP									
16,214.00 CY	1.51 /CY	24,483			-		1.01 /CY	16,376	40,859
0073 GRADE ANGULAR RIPRAP (2 LIFTS)									
84,340.00 SY	.06 /SY	5,060			-		.04 /SY	3,374	8,434
0074 COMPACT ANGULAR RIPRAP									
84,340.00 SY	.04 /SY	3,374			-		.03 /SY	2,530	5,904
0075 DELIVERY OF GRAVEL (FILTER)									
10,802.00 CY			15.07 /CY	162,786	-				162,786
0076 MOVE GRAVEL									
10,802.00 CY	1.51 /CY	16,311			-		1.01 /CY	10,910	27,221
0077 GRADE GRAVEL LAYER (2 PASSES)									
84,340.00 SY	.06 /SY	5,060			-		.04 /SY	3,374	8,434
0078 COMPACT GRAVEL LAYER									
42,170.00 SY	.04 /SY	1,687			-		.03 /SY	1,265	2,952
0079 DELIVERY OF SAND (FILTER)									
10,802.00 CY			8.28 /CY	89,441	-				89,441
0080 MOVE SAND FOR UPPER LAYER									
10,802.00 CY	1.51 /CY	16,311			-		1.01 /CY	10,910	27,221
0081 GRADE UPPER SAND LAYER (2PASS)									
84,340.00 SY	.06 /SY	5,060			-		.04 /SY	3,374	8,434
0082 COMPACT UPPER SAND LAYER									
42,170.00 SY	.04 /SY	1,687			-		.03 /SY	1,265	2,952
0083 DELIVERY OF GENERAL BACKFILL									
27,016.00 CY			6.27 /CY	169,390	-				169,390
0084 MOVE GENERAL BACKFILL									
27,016.00 CY	1.51 /CY	40,794			-		1.01 /CY	27,286	68,080
0085 GRADE GENERAL BACKFILL (3PASS)									
126,510.00 SY	.06 /SY	7,591			-		.04 /SY	5,060	12,651
0086 DEL OF TOPSOIL/GRAVEL ADMIX									
16,214.00 CY			19.03 /CY	308,552	-				308,552
0087 MOVE TOPSOIL/GRAVEL ADMIX									
16,214.00 CY	1.51 /CY	24,483			-		1.01 /CY	16,376	40,859
0088 GRADE TOPSOIL/GRAV ADMIX (3P)									
126,510.00 SY	.06 /SY	7,591			-		.04 /SY	5,060	12,651
0089 DELIVERY OF PEA GRAVEL									
5,400.00 CY			15.50 /CY	83,700	-				83,700
0090 MOVE PEA GRAVEL									
5,400.00 CY	1.51 /CY	8,154			-		1.01 /CY	5,454	13,608
0091 GRADE PEA GRAVEL									
42,170.00 SY	.06 /SY	2,530			-		.04 /SY	1,687	4,217
0093 DELIVERY OF TOPSOIL									
74.00 CY			19.03 /CY	1,408	-				1,408
0094 MOVE TOPSOIL									

Less # 844, 619

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TAKEOFF QTY	LABOR UNIT PRICE	LABOR AMOUNT	MATRL UNIT PRICE	MATRL AMOUNT	SUB AMOUNT	SUB NAME	EQUIP UNIT PRICE	EQUIP AMOUNT	TOTAL AMOUNT
74.00 CY	1.51 /CY	112			-		1.01 /CY	75	186
0095 GRADE TOPSOIL									
74.00 SY	.06 /SY	4			-		.04 /SY	3	7
0096 DELIVERY OF PEA GRAVEL									
25.00 CY			15.50 /CY	388	-				388
0097 MOVE PEA GRAVEL									
25.00 CY	1.51 /CY	38			-		1.01 /CY	25	63
0098 GRADE PEA GRAVEL									
25.00 SY	.06 /SY	2			-		.04 /SY	1	3
0099 DELIVERY OF GRAVEL (TOE DRAIN)									
296.00 CY			15.07 /CY	4,461	-				4,461
0100 MOVE GRAVEL									
296.00 CY	1.51 /CY	447			-		1.01 /CY	299	746
0101 CLEAN FILL WEDGE									
.00 CY					-				0
0102 DELIVERY OF GENERAL BACKFILL									
4,000.00 CY			6.27 /CY	25,080	-				25,080
0103 MOVE GENERAL BACKFILL									
4,000.00 CY	1.51 /CY	6,040			-		1.01 /CY	4,040	10,080
0104 GRADE GENERAL BACKFILL									
4,000.00 SY	.06 /SY	240			-		.04 /SY	160	400
0105 RECLAIM TRAFFIC AREAS & MISC									
.00 CY					-				0
0106 DELIVERY OF PEA GRAVEL									
645.00 CY			15.50 /CY	9,998	-				9,998
0107 MOVE PEA GRAVEL									
645.00 CY	1.51 /CY	974			-		1.01 /CY	651	1,625
0108 GRADE PEA GRAVEL									
645.00 SY	.06 /SY	39			-		.04 /SY	26	65
0109 SEED TRAFFIC AREA									
12.80 AC					-		2,500.00 /AC	32,000	32,000
0110 SEED COVER									
7.80 AC					-		2,500.00 /AC	19,500	19,500
0120 GEOTEXTILE MATERIAL									
219,275.00 SY	.75 /SY	164,456	.45 /SY	98,674	-				263,130
INSTALL FINAL ENG. C		469,752*		2,090,757*				258,237*	2,818,746*
13000.000 REMOVE EQUIPMENT DECON									
0111 REMOVE EQUIPMENT DECON WASH									
1.00 LS	15,000.00 /LS	15,000			-				15,000
REMOVE EQUIPMENT DEC		15,000*							15,000*
14000.000 OFF-SITE DISPOSAL									
0057 OFF -SITE DISPOSAL									
1.00 LS					-		183,620.00 /LS	183,620	183,620
OFF-SITE DISPOSAL								183,620*	183,620*
15000.000 FINAL SITE SURVEY BY HPT									
0112 FINAL SITE SURVEY									
160.00 MH	80.00 /MH	12,800			-				12,800
FINAL SITE SURVEY BY		12,800*							12,800*
			Labor hrs:	160.00			Equip hrs:	160.00	
16000.000 BLDG. 788 DEMO/REM									
0002 788 MANAGEMENT									
1,320.00 MH	77.27 /MH	101,996							101,996

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TAKEOFF QTY	LABOR UNIT PRICE	LABOR AMOUNT	MATRL UNIT PRICE	MATRL AMOUNT	SUB AMOUNT	SUB NAME	EQUIP UNIT PRICE	EQUIP AMOUNT	TOTAL AMOUNT
0003 788 CHARACTERIZATION									
368.00 MH	85.00 /MH	31,280			-				31,280
0004 788 CHARACTERIZATION									
1.00 LS			796,000.00 /LS	796,000	-		10,000.00 /LS	10,000	806,000
0005 INDIRECT FIELD COST									
2,200.00 MH	18.18 /MH	39,996			-				39,996
0006 INDIRECT FIELD COST									
1.00 LS			15,000.00 /LS	15,000	-				15,000
0007 BUILDING 788									
2,180.00 MH	81.65 /MH	177,997			-				177,997
0008 BUILDING 788									
1.00 LS			183,272.00 /LS	183,272	-				183,272
0009 UNIT 48									
3,000.00 MH	24.67 /MH	74,010			-				74,010
0010 UNIT 48									
1.00 LS			25,000.00 /LS	25,000	-		10,000.00 /LS	10,000	35,000
0011 PRODUCTIVITY FACTOR									
11,335.00 MH	46.90 /MH	531,612			-				531,612
BLDG. 788 DEMO/REM		956,891*		1,019,272*				20,000*	1,996,163*
			Labor hrs:	20,403.00			Equip hrs:	20,403.00	
18000.000 TRAINING									
0001 TRAINING									
2,400.00 MH	25.00 /MH	60,000			-				60,000
TRAINING		60,000*							60,000*
			Labor hrs:	2,400.00			Equip hrs:	2,400.00	
19000.000 POSTCLOSURE (MONITORING)									
0001 POSTCLOSURE MONITORING SYSTEM									
1.00 LS					-		876,684.00 /LS	876,684	876,684
POSTCLOSURE (MONITOR								876,684*	876,684*
1.000 LS	876,684.000/LS								
SPEC. CONDITIONS		6,515,393		4,937,957				6,803,856	18,257,205
			Labor hrs:	81,097.00			Equip hrs:	81,097.00	

- 844,619 = $17,412,586

net difference in direct costs = $844,619

$18,257,205
$17,412,586
$844,619

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ESTIMATE TOTALS

6,515,393	Labor	81,097.00	hrs	
4,937,957	Material			
6,803,856	Equipment	81,097.00	hrs	
18,257,206				
2,957,161	BLDG FACTOR (49%)		C	45.38730%
2,500,000	ENGINEERING COSTS		L	
148,139	SMALL TOOLS & CONSUMABLES		C	3.00000%
1,095,432	PROJECT MANAGEMENT		C	6.00000%
4,373,840	CONTRACTOR CONSTRUCTION MGMT		C	23.95679%
3,218,555	CONSTRUCTION MANAGEMENT		C	17.62896%
2,306,632	CONTRACTOR G&A		C	12.63409%
1,060,488	ESCALATION		T	5.80860%
340,000	A/E EG&G SUPPORT		L	
505,739	EG&G FACILITY INSPECTIONS		L	
721,795	EG&G PROCUREMENT RECOVERY 3%		L	
2,585,750	EG&G G&A 10.75%		L	
751,970	EG&G PROJ MNGMT 6% OF CONST		L	
2,112,877	EG&G PROJ MNGMT 15% CONST MNGM		L	
371,136	EG&G PROJ MNGMT - RAD MONITOR		L	
376,465	EG&G CONST MARK-UPS MATL TAX		L	
13,104,956	CONTINGENCY		T	30.00000%
56,788,141	TOTAL ESTIMATE			

estimated total for the cover without the low permeability layer is $ 54,160,995

$ 56,788,141
- $ 54,160,995
$ 2,627,146 net difference

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COST ESTIMATE FOR ROCKY FLATS OPERABLE UNIT 4
POST CLOSURE ENGINEERED BARRIER/COVER MONITORING SYSTEM

CAPITAL COSTS

Direct Capital Cost

Item	Units	Quantity	Cost per Unit	Total
SITE IMPROVEMENT				
Slope Stability Monitoring Installation	l.s	1	$30,000	$30,000
Cap Stability Monitoring Installation	l.s	1	$20,000	$20,000
Cap Moisture Content Monitoring Installation	l.s.	1	########	$186,000
SUBTOTAL				$236,000
CAPITAL EQUIPMENT				
CAP MOISTURE CONTENT MONITORING				
TDR Sensor Data Collection	l.s	1	$58,000	$58,000
FDC Sensor	l.s	1	$49,000	$49,000
Metoerological Monitoring Station	l.s	1	$12,000	$12,000
SUBTOTAL				$119,000
MONITORING SYSTEM HOUSING COMPOUND				
Compound Construction	l.s	1	$6,000	$6,000
Computer Center	l.s	1	$9,000	$9,000
Air Conditioning Unit	each	1	$1,000	$1,000
Software	l.s.	1	$31,000	$31,000
SUBTOTAL				$47,000
CAP & SLOPE STABILITY MONITORING				
Monument and Tape Extensometer	ft	4,000	$30.00	$120,000
Settlement Monument	each	144	$200	$28,800
Other Instrumentation	l.s.	1	$10,000	$10,000
SUBTOTAL				$158,800
SUBTOTAL OF CAPITAL EQUIPMENT COST				$324,800
SUBTOTAL DIRECT CAPITAL COST				$560,800

Indirect Capital Cost

Testwork (capital equipment)	2%	$6,496
Permitting and Deed Changes (site improvement)	5%	$11,800
Equipment Replacement (capital equipment)	5%	$16,240
Construction Oversight (To be included in cost estimate rollup)		
Engineering and Design (To be included in cost estimate rollup)		
Contingency (To be included in cost estimate rollup)		
Building Factor (To be included in cost estimate rollup)		
SUBTOTAL INDIRECT CAPITAL COST		$34,536
TOTAL CAPITAL COST		$595,336

OPERATING AND MAINTENANCE COSTS

Direct Operations and Maintenance Cost

Item	Units	Quantity	Cost per Unit	Annual Cost	Years Incurred
Slope & Cap Stability Monitoring	hour	200	$85	$17,000	1-30
Moisture Content Monitoring	hours	150	$85	$12,750	1-30
Instrumentation Maintenance	hours	150	$85	$12,750	1-30
Engineering Review & Evaluation	l.s.	4	$1,500	$6,000	1-30
Compliance Reporting	each	4	$4,000	$16,000	1-30
Meetings	each	4	$1,200	$4,800	1-30
Data Processing and Evaluation	hours	460	$85	$39,100	1-30
SUBTOTAL				$108,400	
SUBTOTAL ANNUAL COST				$108,400	

Indirect Operations and Maintenance Cost

Contingency (To be included in cost estimate rollup)	
Project Management (To be included in cost estimate rollup)	
Building Factor (To be included in cost estimate rollup)	
Escalation Factor over 30 Years (To be included in cost estimate rollup)	
SUBTOTAL INDIRECT CAPITAL COST	$0
TOTAL ANNUAL OPERATIONS AND MAINTENANCE COST	$108,400

This is a preliminary estimate based on 1992 Means Site Work and Landscape Data, vendor quotes, and engineering judgment.

Attachment 9
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COST ESTIMATE FOR ROCKY FLATS OPERABLE UNIT 4
POST CLOSURE VADOSE ZONE
MONITORING SYSTEM

CAPITAL COSTS

Direct Capital Cost

Item	Units	Quantity	Cost per Unit	Total
SITE IMPROVEMENT				
Vadose Zone Monitoring Installation	l.s.	1	$118,000	$118,000
SUBTOTAL				$118,000
CAPITAL EQUIPMENT				
VADOSE ZONE MONITORING				
Neutron Probe System	l.s.	1	$36,000	$36,000
Pressure Vacuum Lysimeter	l.s.	1	$4,200	$4,200
FDC Sensor	l.s.	1	$11,000	$11,000
SUBTOTAL				$51,200
SUBTOTAL OF CAPITAL EQUIPMENT COST				$51,200
SUBTOTAL DIRECT CAPITAL COST				$169,200

Indirect Capital Cost

Testwork (capital equipment)	2%	$1,024
Permitting and Deed Changes (site improvement)	5%	$5,900
Equipment Replacement (capital equipment)	5%	$1,024
Construction Oversight (To be included in cost estimate rollup)		
Engineering and Design (To be included in cost estimate rollup)		
Contingency (To be included in cost estimate rollup)		
Building Factor (To be included in cost estimate rollup)		
SUBTOTAL INDIRECT CAPITAL COST		$7,948
TOTAL CAPITAL COST		$177,148

OPERATING AND MAINTENANCE COSTS

Direct Operations and Maintenance Cost

Item	Units	Quantity	Cost per Unit	Annual Cost	Years Incurred
Vadose Zone Monitoring	hour	570	$85	$48,450	1-30
Pore Liquid Analysis	each	21	$3,850	$80,850	1-30
Vadose Zone Monitoring Maintenance	hour	40	$85	$3,400	1-30
Compliance Reporting	each	4	$2,000	$8,000	1-30
Meetings	each	4	$1,200	$4,800	1-30
Engineering Review & Evaluation	l.s.	1	$3,000	$3,000	1-30
Data Processing and Evaluation	hour	128	$85	$10,880	1-30
SUBTOTAL				$159,380	
SUBTOTAL ANNUAL COST				$159,380	

Indirect Operations and Maintenance Cost

Contingency (To be included in cost estimate rollup)	
Project Management (To be included in cost estimate rollup)	
Building Factor (To be included in cost estimate rollup)	
Escalation Factor over 30 Years (To be included in cost estimate rollup)	
SUBTOTAL INDIRECT CAPITAL COST	$0
TOTAL ANNUAL OPERATIONS AND MAINTENANCE COST	$159,380

This is a preliminary estimate based on 1992 Means Site Work and Landscape Data, vendor quotes, and engineering judgment.

Attachment 9
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COST ESTIMATE FOR ROCKY FLATS OPERABLE UNIT 4
POST CLOSURE GROUNDWATER
MONITORING SYSTEM

CAPITAL COSTS

Direct Capital Cost

Item	Units	Quantity	Cost per Unit	Total
SITE IMPROVEMENT				
Upper Hydrostratigraphic Well Installation	each	14	$5,700	$79,800
SUBTOTAL				$79,800
CAPITAL EQUIPMENT				
Computer Hardware	each	1	$5,000	$5,000
Computer Data Base	each	1	$10,000	$10,000
Sampling Pumps	each	2	$2,500	$5,000
SUBTOTAL				$20,000
SUBTOTAL OF CAPITAL EQUIPMENT COST				$20,000
SUBTOTAL DIRECT CAPITAL COST				$99,800

Indirect Capital Cost

Testwork (capital equipment)	2%	$400
Permitting (site improvement)	5%	$3,990
Construction Oversight (To be included in cost estimate rollup)		
Engineering and Design (To be included in cost estimate rollup)		
Contingency (To be included in cost estimate rollup)		
Building Factor (To be included in cost estimate rollup)		
SUBTOTAL INDIRECT CAPITAL COST		$4,390
TOTAL CAPITAL COST		$104,190

OPERATING AND MAINTENANCE COSTS

Direct Operations and Maintenance Cost

Item	Units	Quantity	Cost per Unit	Annual Cost	Years Incurred
Groundwater Sampling	each	80	$500	$40,000	1-30
Groundwater Sampling Analysis	each	80	$3,850	$308,000	1-30
Groundwater Disposal	drum	5	$1,200	$6,000	1-30
Compliance Reporting	each	4	$6,000	$24,000	1-30
Meetings	each	4	$1,200	$4,800	1-30
Well Maintenance	l.s.	1	$2,000	$2,000	1-30
Sampling Bottles & Equipment Maintenance	each	80	$150	$12,000	1-30
SUBTOTAL				$396,800	
SUBTOTAL ANNUAL COST				$396,800	

Indirect Operations and Maintenance Cost

Contingency (To be included in cost estimate rollup)	
Project Management (To be included in cost estimate rollup)	
Building Factor (To be included in cost estimate rollup)	
Escalation Factor over 30 Years (To be included in cost estimate rollup)	
TOTAL ANNUAL OPERATIONS AND MAINTENANCE COST	$396,800

This is a preliminary estimate based on 1992 Means Site Work and Landscape Data, vendor quotes, and engineering judgment.

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Attachment 10
Page 1 of 1

DOE, CDHE, EPA Team Meeting

July 25, 1994

AGENDA

1. **Discussion Concerning the Potential Carbon Tetrachloride Contamination**

2. **Upgradient Ground Water Concentrations for PCOCs**

3. **Modeling Results Incorporating Sludge**

4. **Discussion Concerning the Potential for Drilling in SEP 207-C**

5. **Identification of Additional Technical Data that needs to be re-evaluated and Establishing a Path Forward for concluding the Dispute Resolution Review Period.**

Attachment II
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Upgradient Ground Water Concentrations for PCOCs

PCOC	Concentration Range
Barium	87.0 - 200.0 ug/l
Beryllium	0.6 - 5.0 ug/l
Cadmium	1.0 - 5.0 ug/l
Manganese	1.0 - 76.0 ug/l
Mercury	0.2 - 0.6 ug/l
Silver	2.0 - 10.0 ug/l
Strontium	526.0 - 1000.0 ug/l
Zinc	2.0 - 1500.0 ug/l
Nitrate	5.2 - 6.6 mg/l (wells P207389 and 2468)
Am-241	ND - 0.13 pCi/l
Cs-137	ND - 1.2 pCi/l
Pu-239/240	ND - 0.01 pCi/l
Ra-226	0.24 - 0.87 pCi/l
Sr-89/90	0.1 - 1.47 pCi/l
Tritium	57.0 - 1300.0 pCi/l
U-233/234	1.2 - 10.4 pCi/l
U-235	ND - 0.6 pCi/l
U-238	1.0 - 7.0 pCi/l

Notes:

The background wells are P207389, 2486, and 5687.

TABLE 3.4 (Continued)

COMPARISON OF 1992 VOC CONCENTRATIONS IN UNCONSOLIDATED MATERIAL GROUND WATER TO VOC AQUEOUS SATURATION CONCENTRATIONS

			Maximum observed concentrations of compounds during 1992 sampling period (µg/L) and percent of aqueous saturation represented by that concentration (%)													
Monitoring Well --> (including only those containing detectable VOCs during 1992 or 1993)			2286	5687	P207589	05193	P207689	2187	3586	P209789	2886-05093	1786	1386	P207489	2986	B208189
Analyte	Analyte Density (g/cm³)	Analyte Aqueous Solubility (mg/L)														
Methylene Chloride	1.3266	13200														
1,1 Dichloroethane	1.175	5500		12 0.00022 %					62 0.00113 %							
1,1 Dichloroethylene	1.214	400		9 0.00225 %												
t-1,2 Dichloroethylene	1.2565	8690	33 0.00038 %	19 0.00022 %					58 0.00067 %							
1,1,1 Trichloroethane	1.325	950		5 0.00053 %					9 0.00095 %							
Chloroform	1.485	8220	120 0.00146 %	6 7.3e-5 %												
Trichloroethylene	1.462	1000	660 0.066 %	82 0.0082	7 0.0007 %											
Carbon tetrachloride	1.5947	800	750 0.09375 %													
Perchloroethylene	1.625	150		5 0.00333 %												
Carbon Disulfide	1.2632	2000														
Vinyl chloride	0.9106	1100												5 0.00025 %		
Toluene	0.8669	500							720 0.06545 %							
Xylene	0.8802	150												11 0.0022 %	8 0.0016 %	16 0.0032 %
2-Hexanone	0.9133	35000												6 0.004 %		14 0.00933 %
4-Methyl-2-Pentanone	0.7978	17000														

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TABLE (Continued)
COMPARISON OF 1992 VOC CONCENTRATIONS IN WEATHERED BEDROCK GROUND WATER TO VOC AQUEOUS SATURATION CONCENTRATIONS

			Maximum observed concentrations of compounds during 1992 sampling period (µg/L) and percent of aqueous saturation represented by that concentration (%)												
Monitoring Well --> (including only those containing detectable VOC's during 1992 or 1993)			P209389	P209189	P210189	P207589	P207789	P209689	76292	P208989	3086	P209889	P209489	P210089	P208189
Analyte	Analyte Density (g/cm³)	Analyte Aqueous Solubility (mg/L)													
Methylene Chloride	1.3266	13200						10 7.6E-5 %							
1,1 Dichloroethane	1.175	5500		5 9.1E-5 %											
1,1 Dichloroethylene	1.214	400	68 0.017 %		8 0.002 %										
t-1,2 Dichloroethylene	1.2565	8690		9 0.0001 %	160 0.00184 %										
1,1,1 Trichloroethane	1.325	950													
Chloroform	1.485	8220	13 0.00016 %	6 7.3E-5 %	530 0.00645 %										
Trichloroethylene	1.462	1000		16 0.0016 %	4600 0.46 %										
Carbon tetrachloride	1.5947	800	72 0.009 %		11000 1.375 %										
Perchloroethylene	1.625	150		9 0.006 %	9 0.006 %										
Carbon Disulfide	1.2632	2000				46 0.0023 %									12 0.0006 %
Vinyl chloride	0.9106	1100													
Toluene	0.8669	500													11 0.0022 %
Xylene	0.8802	150													5 0.00333 %
2-Hexanone	0.9133	35000													
4-Methyl-2-Pentanone	0.7978	17000													

[a] µg/l = Micrograms per liter.
[b] g/cm³ = Grams per cubic centimeter.
[c] mg/L = Milligrams per liter.

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TABLE 3.4-5

COMPARISON OF 1993 VOC CONCENTRATIONS IN UNCONSOLIDATED MATERIAL GROUND WATER TO VOC AQUEOUS SATURATION CONCENTRATIONS

			Maximum observed concentrations of compounds during 1993 sampling period (µg/L)[a] and percent (%) of aqueous saturation represented by that concentration													
Monitoring Well --> (including only those containing detectable VOC's during 1992 or 1993)			2286	5687	P207589	05193	P207689	2187	3586	P209789	2886-05093	1786	1386	P207489	2986	B208189
Analyte	Analyte Density (g/cm³)[b]	Analyte Aqueous Solubility (mg/L)[c]														
Methylene Chloride	1.3266	13200				2 1.5E-5 %	3 2.3E-5 %	36 0.00027 %			1 7.6E-6 %					
1,1 Dichloroethane	1.175	5500		10 0.00018 %					52 0.00095 %							
1,1 Dichloroethylene	1.214	400		6 0.0015 %												
t-1,2 Dichloroethylene	1.2565	8690	35 0.0004 %	13 0.00015 %					10 0.00012 %							
1,1,1 Trichloroethane	1.325	950		4 0.00042 %					6 0.00063 %							
Chloroform	1.485	8220	170 0.00207 %	6 7.3E-5 %		0.3 3.6E-6 %					0.6 7.3E-6 %					
Trichloroethylene	1.462	1000	25 0.0025 %		6 0.0006 %	18 0.0018 %				4 0.0004 %	1 0.0001 %	2 0.0002 %				
Carbon tetrachloride	1.5947	800	29 0.00363 %													
Perchloroethylene	1.625	150	5 0.00333 %	3 0.002 %							0.5 0.00033 %		2 0.00133 %			
Carbon Disulfide	1.2632	2000														
Vinyl chloride	0.9106	1100							200 0.01818 %							
Toluene	0.8669	500									0.3 6E-5 %					
Xylene	0.8802	150														
2-Hexanone	0.9133	35000														
4-Methyl-2-Pentanone	0.7978	17000											2 1.2E-5 %			

Attachment 12
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TABLE 3 (Continued)

COMPARISON OF 1993 VOC CONCENTRATIONS IN WEATHERED BEDROCK GROUND WATER TO VOC AQUEOUS SATURATION CONCENTRATIONS

			Maximum observed concentrations of compounds during 1993 sampling period (µg/L) and percent of aqueous saturation represented by that concentration (%)												
Monitoring Well --> (including only those containing detectable VOCs during 1992 or 1993)			P209389	P209189	P210189	P207589	P207789	P209689	76292	P208989	3086	P209889	P209489	P210089	P208189
Analyte	Analyte Density (g/cm³)	Analyte Aqueous Solubility (mg/L)													
Methylene Chloride	1.3266	13200					1 7.6E-6 %		0.2 1.5E-6 %	4 6.1E-5 %	8 6.1E-5 %	3 2.3E-5 %		3 2.3E-5 %	
1,1 Dichloroethane	1.175	5500	1 1.8E-5 %												
1,1 Dichloroethylene	1.214	400	51 0.0127 %		7 0.00175 %										
t-1,2 Dichloroethylene	1.2565	8690			100 0.00115 %								11 0.00013 %		
1,1,1 Trichloroethane	1.325	950	1 0.00011 %												
Chloroform	1.485	8220	9 0.00011 %	4 4.9E-5 %	380 00.00462 %								25 0.0003 %		
Trichloroethylene	1.462	1000	2 0.0002 %	15 0.0015 %	380 0.038 %								84 0.0084 %		
Carbon tetrachloride	1.5947	800	22 0.00275 %	2 0.00025 %	660 0.0825 %								75 0.00938 %		
Perchloroethylene	1.625	150		9 0.006 %	7 0.00467 %					1 0.00067 %	2 0.00133 %		5 0.00333 %		
Carbon Disulfide	1.2632	2000				2 0.0001 %									
Vinyl chloride	0.9106	1100													
Toluene	0.8669	500													
Xylene	0.8802	150													
2-Hexanone	0.9133	35000						11 3.1E-5 %							
4-Methyl-2-Pentanone	0.7978	17000													

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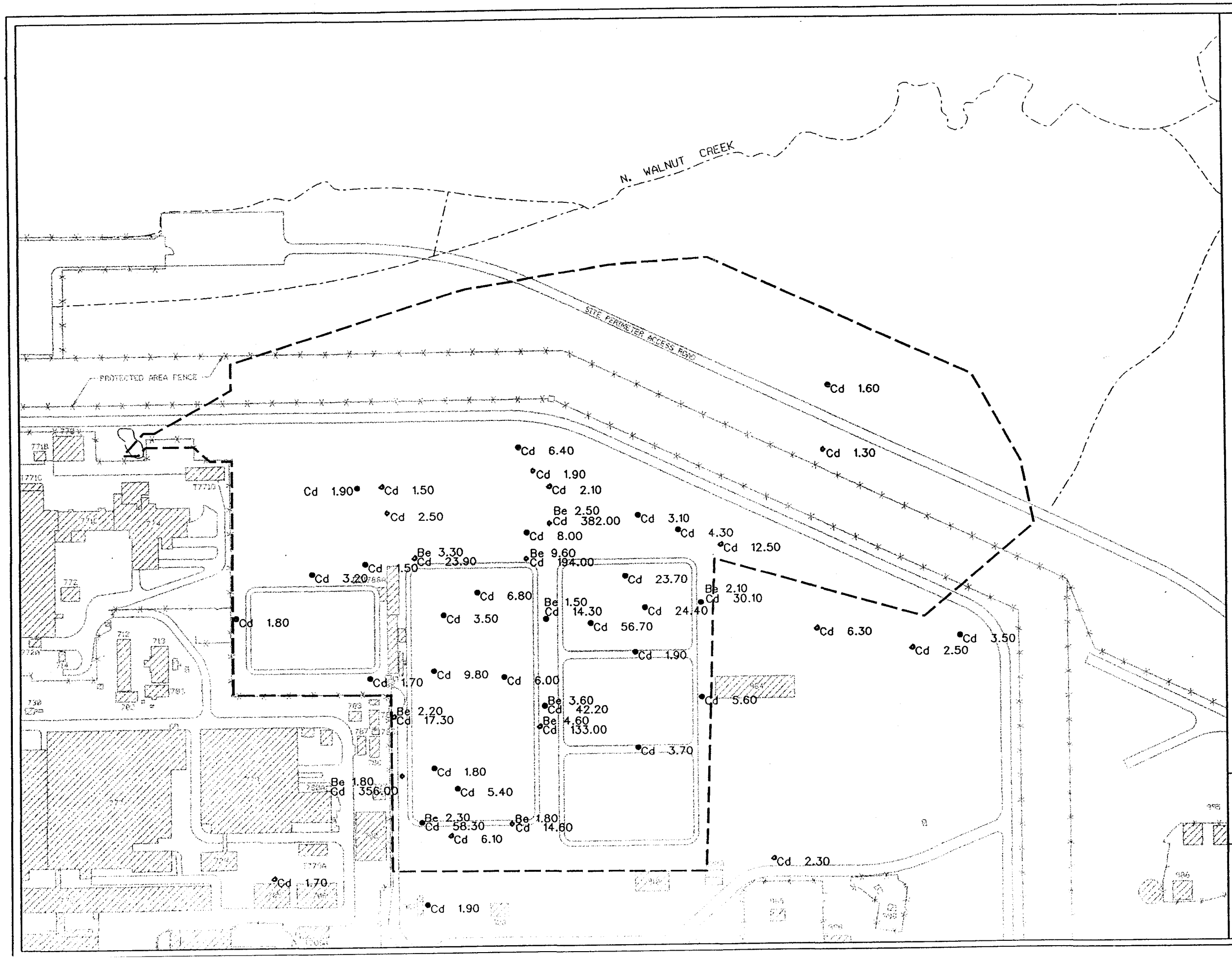

Attachment 4
page 1081

N. WALNUT CREEK

SITE PERIMETER ACCESS ROAD

PROTECTED AREA FENCE

Am 0.71 +-0.09
Pu 0.82 +-0.11

Cs 0.008 +-0.026

Pu 0.46 +-0.06
Am 0.58 +-0.10
Pu 1.00 +-0.15

Am 0.58 +-0.10
Pu 1.20 +-0.22

Am 0.34 +-0.05
Cs 0.006 +-0.166

Am 0.45+-0.08
Pu 0.50+-0.06

Am 1.50 +-0.32
Pu 4.90 +-1.20

Am 0.98+-0.12
Pu 3.08+-0.33

Am 7.50+-0.87
Pu 19.00 +-3.20

Am 1.50 +-0.23

Am 2.00 +-0.44
Pu 1.90 +-0.52
Cs 0.012+-0.185

Am 0.93+-0.15
Pu 2.10+-0.22

Am 2.10 +-0.24
Pu 3.30 +-0.65

Am 4.50 +-0.70
Pu 3.40 +-0.57
Cs 0.006 +-0.205

Am 1.38 +-0.15
Pu 5.33 +-0.56

Am 27.00 +-2.30

Am 130.00+-7.50

Am 2.78+-0.29
Pu 5.53 +-0.58

Am 2.50 +-0.36
Pu 7.90 +-1.50

Am 0.46 +-0.04

Am 2.50+-0.36

Am 44.68+-4.97
Pu 8.54 +-0.85

Am 20.18 +-2.19
Pu 10.05 +-1.11

Am 20.18 +-0.026
Cs 0.033 +-2.19

Am 3.30 +-0.37
Pu 14.00 +-1.90

Am 8.96 +-0.90
Pu 9.03+-0.90

Am 0.43 +-0.04

Am 12.00+-2.70
Pu 4.90+-1.00
Cs 0.005 +-0.074

Am 2.78 +-0.30
Pu 19.78 +-2.25

Am 1.13 +-0.25
Pu 1.04 +-0.27

Am 4.40 +-0.66
Pu 4.20 +-0.61

Cs 0.003 +-0.091
Pu 0.43 +-0.08

Am 1.03+-0.12
Pu 1.53 +-0.18

Am 4.90 +-0.80

Pu 1.86 +-0.21
Am 2.13+-0.23

Am 0.56 +-0.06

Pu 2.55 +-0.57

Am 1.24 +-0.14
Pu 2.73 +-0.32

Am 2.11 +-0.23
Pu 9.22 +-1.02

Am 110.00+-18.00
Pu 17.00 +-3.70

Pu 5.32 +-0.53

Am 11.69 +-1.32
Pu 12.87 +-1.39
Cs 0.002+-0.013

Am 55.00 +-4.10
Cs 0.007 +-0.076

Cs 0.008 +-0.013

Am 92.00 +-6.90

Pu 0.68 +-0.12

Pu 0.64 +-0.08
Cs 0.007 +-0.026

Am 220.00+-54.00
Pu 56.00+-10.00

Am 2.17 +-0.48
Pu 4.55 +-1.02

Am 0.97 +-0.23
Pu 0.39 +-0.17

Am 1.70 +-0.34
Pu 2.10 +-0.29
Cs 0.002 +-0.070

Am 16.43+-1.80
Pu 7.45+-0.76

Am 3.20 +-0.44

Am 1.15 +-0.13
Pu 0.43+-0.07

Am 0.48+-0.06

Am 7.05+-0.73
Pu 2.83 +-0.30

Am 0.36 +-0.06
Pu 1.45 +-0.18

Am 0.52 +-0.05

Am 0.41 +-0.10

Cs 0.022 +-0.029
Pu 0.39 +-0.08

Pu 0.44 +-0.08

N

LEGEND:

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Remediation Boundary
- Alluvium Monitoring Well
- RI Phase I Soil Boring
- Random Surficial Soil Location
- Discrete Surficial Soil Location

46693
Chemical, Result +-err

Preliminary Remediation Goals (PRG):

Americium-241	0.27 pCi/g
Plutonium-239/240	0.38 pCi/g
Cesium-134	0.001 pCi/g

100 0 100 200 300 FEET

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ROCKY FLATS PLANT
GOLDEN, COLORADO

Appendix IV.C-2

Solar Evaporation Ponds,
Operable Unit No. 4, IM/IRA EA DD,
Summary Map of Surficial Soil
Contamination at Levels Greater
Than PRGs

Attachment 5
Page 1 of 1

N. WALNUT CREEK

SITE PERIMETER ACCESS ROAD

PROTECTED AREA FENCE

U238 1.50 +-0.23

U235 0.10 +-0.07

U235 0.17 +-0.06
U238 2.30 +-0.29

U235 0.18 +-0.09
U238 1.90 +-0.36

U235 0.51 +-0.23
U238 1.90 +-0.53

U233 6.60 +-0.97
U235 0.19 +-0.10
U238 4.10 +-0.67

U235 0.18+-0.29
U238 3.30+-0.05

U238 1.30 +-0.20

U235 0.18+-0.10
U238 2.30+-0.47

U235 0.11 +-0.08

U233 5.82 +-0.90
U238 3.57+-0.61

U238 2.00 +-0.24

U235 0.13 +-0.08

U233 41.00+-3.40
U235 2.30+-0.28
U238 27.00+-2.30

U235 0.09+-0.08
U238 1.47+-0.40

U235 0.13 +-0.10
U238 1.43+-0.38

U238 2.20+-0.41
U235 0.14 +-0.09

U233 5.70+-0.65
U235 0.30 +-0.12
U238 4.70+-0.56

U233 63.40+-10.40
U235 1.69 +-0.46
U238 25.47+-4.31

U235 0.25+-0.15
U238 1.60 +-0.43

U233 11.00 +-1.70
U235 0.29 +-0.14
U238 7.00 +-1.20

U235 0.12 +-0.08
U238 2.27 +-0.46

U238 1.28 +-0.29

U235 0.17 +-0.07
U238 2.74+-0.61

U238 2.60 +-0.60

U233 14.17+-2.52
U235 0.48 +-0.22
U238 6.63+-1.30

U233 11.66 +-2.00
U235 0.38 +-0.18
U238 5.92 +-1.12

U238 1.40 +-0.32
U235 0.10 +-0.09
U238 1.43+-0.37

U238 1.30 +-0.45

U235 0.12 +-0.10

U235 0.11 +-0.09

U238 2.95 +-0.71

U235 0.11 +-0.09
U235 0.22 +-0.10

U233 11.78+-2.02
U235 0.40 +-0.18
U238 10.00+-1.74

U238 1.34 +-0.29

U238 1.80 +-0.37

U238 1.30 +-0.23
U235 0.75 +-0.19
U238 8.40+-0.89

U233 14.00+-1.40

U233 6.10 +-1.60
U235 0.53 +-0.33
U238 5.00 +-1.40

U233 7.90+-0.73
U235 0.49+-0.10
U238 6.30 +-0.61

U238 1.42 +-0.36

U238 2.21 +-0.53

U235 0.12 +-0.13

U235 0.21+-0.13
U238 5.20 +-0.95

U238 1.50 +-0.35

U235 0.13 +-0.08
U238 2.52+-0.45

U238 1.33 +-0.30

U235 0.09 +-0.08

LEGEND:

- Streams
- Paved Roads
- Buildings
- Fence
- OU4 Remediation Boundary
- Alluvium Monitoring Well
- RI Phase I Soil Boring
- Random Surficial Soil Location
- Discrete Surficial Soil Location

46693
Chemical, Result +-err

Preliminary Remediation Goals (PRG):

Uranium-233/234	5.25 pCi/g
Uranium-235	0.09 pCi/g
Uranium-238	1.27 pCi/g

100 0 100 200 300 FEET

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Appendix IV.C-3

Solar Evaporation Ponds, Operable Unit No. 4, IM/IRA EA DD, Summary Map of Surficial Soil Contamination at Levels Greater Than PRGs

attachment 11
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P208789
B208789
SED009
SW017
SW093
1786
1686
B208689
B210389
B208589
B210489
1586
1486
1386
GS13
SED092
SW092
B208289
B208389
B208489
SP1287
SW095
SP1487
SP1187
40093
40193
46393
46493
0671
40293
SS403493
SS401193
0160
40593
40493
1886
44693
SS402593
SS403593
45393
SP1387
44893
45293
44993
45093
SP1587
SS402093
40393
SS403693
SED124
SW086
SS400493
SW102
SW084
SW124
P219189
SS401743
SW120
SED120
SW119
45593
SS403393
SW088
46093
46193
SS404893
40693
45693
SP1087
SS404793
SW105
P209889
0260
SS404993
46293
SS403193
SP0987
42693
45993
45793
45893
SS401593
SS401393
2086
SS403293
40793
SW085
SS404593
P208889
3987
SP0887
SS403093
3086
SS404693
40893
SW090
3286
3186
41193
SW089
P208989
P209589
41293
SW091
0266
63692
SS402393
P209489
SS400393
SS402893
SW106
SS400293
40993
42093
SP0287
46693
41593
SS400993
46793
SP0687
42193
SP0587
41693
46593
0360
41893
40191
P209389
P209289
41993
P218389
43293
SS401093
42393
SP0187
42293
2786
76292
0366
P209189
P210189
SS401693
42493
42593
46993
73092
SS401493
40291
SS402193
2286
43793
207B-C
46893
43193
47093
SS400593
SS400693
72992
76192
5687
SP1687
43593
42893
Background
2986
43493
P209789
0460
P210289
SS402793
43393
SP0487
05393
72892
P209689
72592
72692
72792
43693
3787
SS402293
72492
SP0387
207A-SOUTH
43593
207B-SOUTH
SP0787
05193
44093
P213989
P213889
SS402993
43893
SS401893
25886
P207589
44193
72392
P219489
P207689
72292
P207789
SS401293
02691
SS401993
SS400193
2386
2486
SS402693
0560
44593
44393
P219589
Background
P207489
05293
P207389
Background

Background

Wells
declaring
Carbon
Tetrachloride

Backyard

Backyard

Backyard

Attachment 7a
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